

Sheila's draft responses to Stakeholder Comments received 6/8/98 for Salmon Subcommittee review, 6/10/98.

~~UNDERLYING ASSUMPTIONS FOR ESTIMATING FISHERY EFFECTS OF CALFED ALTERNATIVES~~

June 5, 1998

SALMON

1. Survival of outmigrating salmon smolts through the Delta and the number of smolts leaving the Delta is directly related to production of adults.

*We attempted to address this comment in the INTRODUCTION, second paragraph. I suggest clarifying the issue with the following revisions.*

*Analysis of survival throughout the entire Sacramento and San Joaquin basins, in the Delta and Bay and in the ocean would be necessary to evaluate the effects of the CALFED Alternatives in the Delta on Chinook population dynamics. Evaluation of effects on survival upstream of the Delta would be particularly important for CALFED's Ecosystem Restoration and Water Quality Programs. Evaluation of effects of ocean conditions, commercial and recreational harvests would be important to provide an appropriate perspective on impacts upstream of the Delta, in the Delta and bay, and in the ocean. The within Delta analysis is not sufficient to evaluate the effects of the CALFED Alternatives in the Delta on Chinook population dynamics, but is sufficient to describe the full effects on Chinook of the alternative ways of transferring water across the Delta being considered in the CALFED Program.*

2. Hatchery grown salmon smolts released upstream of or in the Delta behave the same as "wild" salmon smolts.

*We don't have data on smolt survival in the Delta using "in-river grown" smolts. I suggest clarifying the issue with the following revision to RESULTS, third paragraph.*

*While the subcommittee made separate estimates for the five parameters under Interior Delta survival (IDS) to represent knowledge of the individual parameters, the subcommittee was more certain of the IDS estimate. The certainty was based on extensive smolt release and recapture experiments. The paired experiments were designed to estimate differential survival of smolts released simultaneously in the mainstem Sacramento River and in the Interior Delta and recaptured downstream of the Delta. Although paired experiments were performed to estimate differential survival in order to minimize error associated with variation in environmental conditions and the use of hatchery smolts, the subcommittee recommends consistent environmental conditions and the use of "in-river" smolts to further reduce error. The experiments were not designed to identify the sources of decrease survival, but the subcommittee assumes the sources to be the five parameters under IDS. The results of the paired experiments were survival of smolts diverted into the interior Delta was one*

*third or less of the the survival of smolts remaining in the mainstem Sacramento River (Table X). The small proportion of Chinook salvaged at the CVP and SWP south Delta exports indicates most the decreased survival is due to Interior Delta Survival rather than Entrainment Losses.*

3. San Joaquin River smolt survival through the Delta, and subsequent escapement and production, are each related positively to San Joaquin River flow at the time of outmigration.

*Although I did not find the narrative description of effects of Flow at Vernalis in the draft report, I assume this comment refers to the matrix scores for Flow at Vernalis. I remember we discussed flow at Vernalis as being inadequate for San Joaquin Chinook, but I did not find a narrative describing it in the draft report. I suggest we include a narrative description of the effects of the Flow at Vernalis parameter in the draft report in the Chinook Salmon from the San Joaquin System, fourth paragraph and support it with data if available. I am not well versed on San Joaquin data. Does anyone else in our group have data to support this?*

*As described in the response to Comment 1, the within Delta analysis is not sufficient to evaluate effects on Chinook population dynamics, such as escapement and subsequent production. Analysis of survival throughout the entire Sacramento and San Joaquin basins, in the Delta and Bay and in the ocean would be necessary to evaluate the effects of the CALFED Alternatives in the Delta on Chinook population dynamics.*

4. Smolt survival through the Delta, and subsequent escapement and production are each related negatively to exports during the time of smolt outmigration, especially for San Joaquin River smolts.

*I am unable to respond to this comment as written. Exports were not a parameter in the matrix. Exports were used to evaluate the Entrainment Losses parameters, not survival through the Delta.*

*As described in the response to Comment 1, the within Delta analysis is not sufficient to evaluate effects on Chinook population dynamics, such as escapement and subsequent production. Analysis of survival throughout the entire Sacramento and San Joaquin basins, in the Delta and Bay and in the ocean would be necessary to evaluate the effects of the CALFED Alternatives in the Delta on Chinook population dynamics.*

5. Movement of outmigrating salmon smolts through the Delta is significantly affected by the magnitude and direction of net (tidally averaged) flow. Therefore, export pumping draws or otherwise causes the movement of outmigrating salmon from the Sacramento, San Joaquin, and Mokelumne rivers into the southeastern Delta and ultimately to the export pumps. It also draws or otherwise causes the movement of other fish, such as Delta smelt, to the export pumps.

*I assume this comment is in reference to the narrative description in RESULTS, Chinook Salmon From The Sacramento System, Interior Delta Survival, second paragraph, and the Flow Distribution matrix parameter values. By changing the matrix values under the Flow Distribution parameter to the greatest extent among those five parameters, we infer the Interior Delta Survival parameter is affected predominantly by "Flow". I suggested a few weeks ago that if the matrix values for Flow Distribution change the most, then there should be a strong, consistent correlation between these "flows" and Interior Delta Survival. Pat Brandes reported a relationship between QWEST and Jersey Point survival. I suggest clarifying the issue by reviewing that relationship and other "reverse flow" and survival relationships and include our conclusions as a narrative description in the draft report. I suggest clarifying the use of "Flow Distribution" with the following revisions.*

*Another group is Interior Delta Survival (IDS). IDS reflects survival of Sacramento smolts diverted from the mainstem Sacramento River into the Mokelumne and lower San Joaquin Delta. IDS is the sum of five parameters expected to contribute to IDS, Flow Distribution, Delta Cross Channel Operations, Predation, Temperature and Salinity. Flow Distribution was represented by flows in Old and Middle Rivers and San Joaquin River downstream of the Mokelumne River in the DSMII Operations Studies. Old and Middle Rivers connect the lower San Joaquin River to the south Delta exports. The subcommittee assumed Flow Distribution to be a surrogate for the indirect effect on survival of prolonged emigration controlled by flow and olfactory emigration cues.*

6. Other factors affecting the survival of eggs to adults, such as predation and food supply, are insignificant or constant from year to year.

*Predation within the Delta and food supply were addressed in the matrix under the Interior Delta Survival Predation parameter and in the Food Supply parameter. Predation within the Delta and food supply were addressed in the draft report under RESULTS, Chinook Salmon From The Sacramento System, Common Programs, first and second paragraphs. The changes in matrix values were not "insignificant", although they were constant from year to year, since the entire evaluation was based on either 73 or some subset of the 73 year average DWRSIM and DMSII Operation Studies. The subcommittee recommends further analysis of annual variability.*

7. Direct mortality of fish at the export pumps is mortality that would not have otherwise occurred.

*We evaluated the Interior Delta Survival of those smolts no longer exposed to Entrainment Losses.*

8. A physical barrier at the Head of Old River will reduce the number of outmigrating salmon smolts reaching the southeastern Delta.

*Don't understand the comment.*

9. The abundance of anadromous and resident fish continues to be negatively related to X2 in February through June. Recent changes in the estuary have not invalidated these relationships.

*Not applicable to this analysis.*

10. Returning to flow conditions that would have existed under past levels of development will increase abundance of anadromous fish.

*Not applicable to this analysis.*

11. The appropriate way to specify these flow of other conditions is by X2 rather than by some other measure or measures.

*Not applicable to this analysis.*

12. There is a positive relationship between Sacramento River flow and :

Early survival of striped bass (egg to larvae)

*Not applicable to this analysis.*

Survival of outmigrating salmon smolts

*The Newman Rice analysis resulted in a positive relationship between flow at Sacramento and recapture rate of smolts at Chipps Island and in the ocean (Statistical Model for Survival of Chinook Salmon Smolts Outmigrating through the Lower Sacramento-San Joaquin System, Dec 1997). I suggest clarifying how the model was used with the following revisions to RESULTS, Chinook Salmon From The Sacramento System, Alternative 2, second paragraph.*

*An adverse effect would be the reduction of flow in the Sacramento River below the Hood diversion. The subcommittee assumed survival would decrease 20% due to a Hood diversion of 10,000 cfs from a Sacramento River flow of 20,000 cfs (does someone have a better recollection of the flows we were considering at the time?) An attempt was made to use the Rice/Newman model to verify the survival decrease of 20%. The model results of changing Sacramento River flows in isolation of other model parameters were survival decreased by 80% for every 50% reduction in Sacramento River flow. Although the modelers recommended adjusting other parameters highly related to flow, such as salinity, the subcommittee did not have the time necessary to use the model appropriately. The subcommittee assumed salinity would not change significantly due to agricultural salinity standards. The subcommittee expected survival would decrease from September through June, with the greatest reductions occurring when the greatest fraction of the flow is being diverted at Hood and when the flows are the lowest.*

Survival of other fish.

*Not applicable to this analysis.*

13. Rapid increases in export rates causes more fish to be drawn into the sotheastern Delta and to the export pumps.

*Not applicable to this analysis.*

15. Higher levels of direct mortality at the export pumps.

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16. There is a direct positive relationship between export rates and:

Salmon smolt survival through the Delta

*I am unable to respond to this comment as written. Exports were not a parameter in the matrix. Exports were used to evaluate the Entrainment Losses parameters, not survival through the Delta.*

The presense of other fish in the southeastern Delta

*Not applicable to this analysis.*

Direct mortality at the export pumps.

*There is a positive relationship between export rates and the relative Entrainment Losses of smolts in the vicinity of the export pumps. Over a short period of time, such as days, when export rates increase, relative Entrainment Losses of smolts in the vicinity of the export pumps increases.*

17. The Rice-Newman model reliably demonstrates increased smolt survival when the Cross Channel Gates are closed in the spring.

*The Newman Rice analysis resulted in a positive relationship between Cross Channel Gate Operations and recapture rate of smolts at Chipps Island and in the ocean (Statistical Model for Survival of Chinook Salmon Smolts Outmigrating through the Lower Sacramento-San Joaquin System, Dec 1997).*

18. The Rice-Newman results can be extrapolated to the November-January period.

*Not applicable to this analysis.*

19. Closing the Delta Cross Channel in November and January will not adversely affect other fish or aspects of Delta ecology.

*Not applicable to this analysis. Closed Delta Cross Channel Gates in November and January was the default in the DWRSIM and DMSII Operation Studies.*

20. The fraction of total Delta inflow exported is directly related to various factors (including direct mortality at the export pumps, survival of outmigrants through the Delta, movement of fish into the southeastern Delta, and indirect mortality) affecting the abundance of juvenile forms of anadromous and other fish.

*Export/Inflow ratio was not a parameter in the matrices and was not evaluated in the draft report. Not applicable to this analysis.*

20. QWEST, the calculated net flow in the lower San Joaquin River, is directly related to various factors (including direct mortality at the export pumps, survival of outmigrants through the Delta, movement of fish into the southeastern Delta, and indirect mortality) affecting the abundance of juvenile forms of anadromous and other fish.

*This seems repetitious of comment #5, so I'll repeat response #5.*

*I assume this comment is in reference to the narrative description in RESULTS, Chinook Salmon From The Sacramento System, Interior Delta Survival, second paragraph, and the Flow Distribution matrix parameter values. By changing the matrix values under the Flow Distribution parameter to the greatest extent among those five parameters, we infer the Interior Delta Survival parameter is affected predominantly by "Flow". I suggested a few weeks ago that if the matrix values for Flow Distribution change the most, then there should be a strong, consistent correlation between these "flows" and Interior Delta Survival. Pat Brandes reported a relationship between QWEST and Jersey Point survival. I suggest clarifying the issue by reviewing that relationship and other "reverse flow" and survival relationships and include our conclusions as a narrative description in the draft report. I suggest clarifying the use of "Flow Distribution" with the following revisions.*

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22. The survival or abundance of juvenile anadromous and other fish is directly and positively related to the subsequent abundance of adults.

*This seems repetitious of Comment #1, so I'll repeat response #1.*

*We attempted to address this comment in the INTRODUCTION, second paragraph. I suggest clarifying the issue with the following revisions.*

*Analysis of survival throughout the entire Sacramento and San Joaquin basins, in the Delta and Bay and in the ocean would be necessary to evaluate the effects of the CALFED Alternatives in the Delta on Chinook population dynamics. Evaluation of effects on survival upstream of the Delta would be particularly important for CALFED's Ecosystem Restoration and Water Quality Programs. Evaluation of effects of ocean conditions, commercial and recreational harvests would be important to provide an appropriate perspective on impacts upstream of the Delta, in the Delta and bay, and in the ocean. The within Delta analysis is not sufficient to evaluate the effects of the CALFED Alternatives in the Delta on Chinook population dynamics, but is sufficient to describe the full effects on Chinook of the alternative ways of transferring water across the Delta being considered in the CALFED Program.*

23. Changes in flows and exports in December and January have direct effects on the abundance of spring run salmon and other fish. The influence of other factors is constant or negligible and will therefore not influence these effects.

*Seems repetitious of the combination of Comments #1, #6, #12, #16, and #22. Rather than repeat the responses, please just refer to them.*

24. Indirect mortality is caused by water project operations in the Delta and is significant relative to direct mortality.

*Seems repetitious of Comments #5 and #21. Rather than repeat the responses, please just refer to them.*